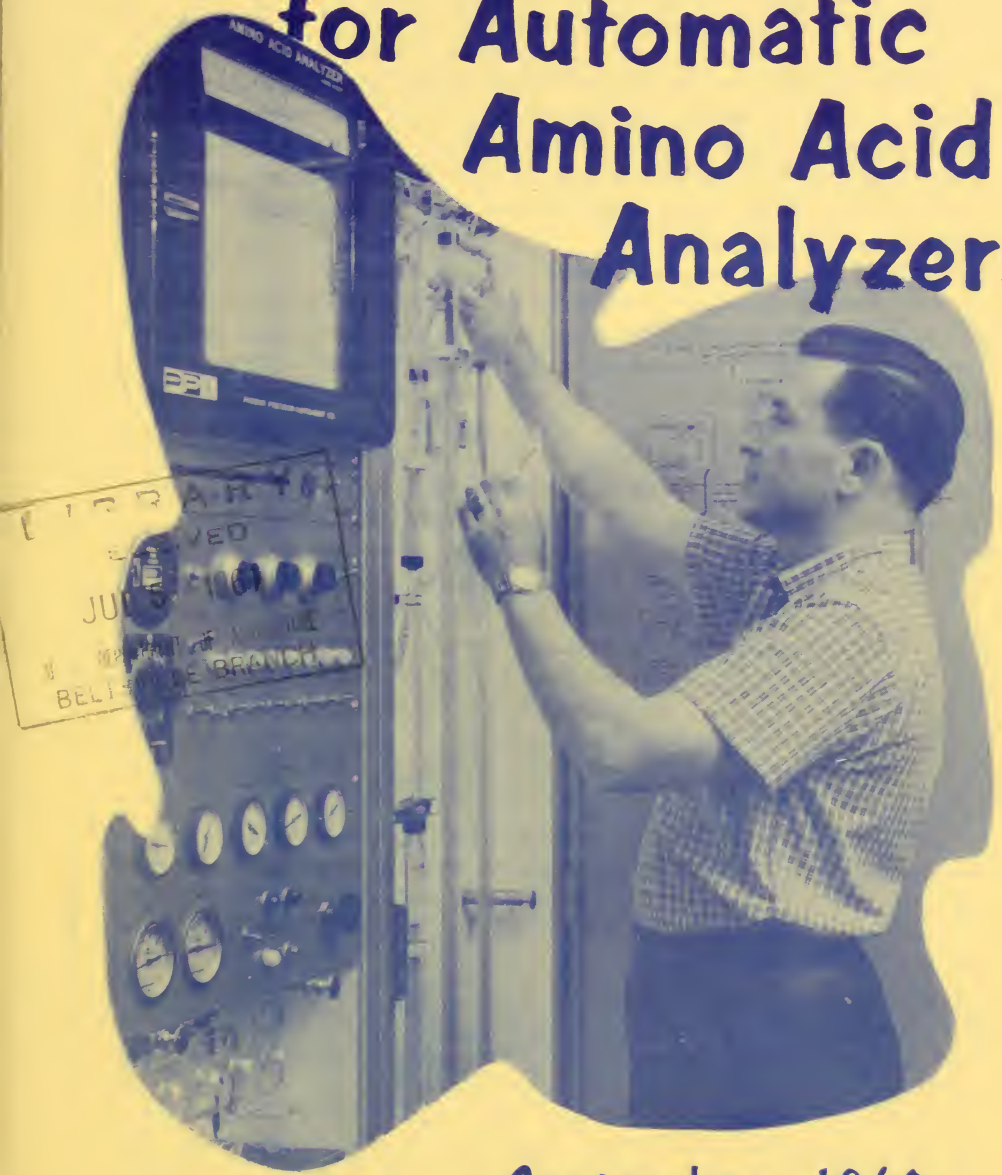
Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

A381
R31A
#29
Copy 2

ARS 73-29

Shut-Off Device for Automatic Amino Acid Analyzers



LIBRARY
RECEIVED
JUL
BELTSVILLE BRANCH

September 1960

AGRICULTURAL RESEARCH SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

SHUT-OFF DEVICE FOR AUTOMATIC AMINO ACID ANALYZERS

Eugene A. Talley and William L. Porter

In routine use of an automatic amino acid analyzer in the Plant Products Laboratory of the Eastern Utilization Research and Development Division, only four all-night runs could be made per week unless someone came in over weekends to shut off the equipment at the end of a run. To start another analysis required from 2 to 3 hours. An automatic device has been assembled and incorporated into the analyzer, which turns off the ninhydrin pump at a predetermined time, and three-quarters of an hour later shuts down the entire equipment. With a minimum of time spent in the laboratory, weekend runs can now be made. This apparatus was installed on a Phoenix Precision Instrument Company analyzer [1/], based upon the equipment of Spackman, Moore, and Stein [2/] but with minor modifications in wiring it can be employed with any equipment requiring delayed shut-off times.

The Phoenix instrument, as delivered, was furnished with double-pole single-throw switches with associated pilot lights to control the running time indicator; the recorder; pumps 1, 2, and 3; the circulating bath; and the reaction bath. The program control timer was controlled by a double-pole, double-throw switch. All were mounted in a row on the front panel board. The power supply was connected to the center terminal of these switches and the pilot lights

---

1/ Mention of commercially available equipment does not imply endorsement by the U. S. Department of Agriculture over others of a similar nature not mentioned.

2/ Spackman, D. M., Stein, W. H., and Moore S. *Analytical Chem.*, *30*: 1190-1206 (1958).

and items to be controlled were connected to the side terminals. The power supply was continued on to the photometer lamp supply.

For automatic shut-off, these switches were replaced by double-pole, double-throw, center-off switches (Cutler-Hammer, #7563-K4 with lug terminals). The power supply was connected to the lower set of terminals as mounted on the panel board and each pilot light was connected to the center terminal of each switch. This makes the upper terminals available for a power supply from a suitable timer. Any individual item to be controlled may be operated from either source with the pilot light operative. (Care must be taken to check the individual switch wiring so that when the power supply is connected to a terminal, the switch handle will point in the desired direction).

The program control timer is controlled by a double-pole, double-throw switch which energizes the other side of the switch when the handle is in the off position. To minimize the disturbance in this circuit, a second switch of the same type was connected between the power supply and the center terminals of the original switch. This made the other side of the second switch available for connection to the automatic shut-off timer, and the program control timer can be operated either directly from the main power switch or through the automatic shut-off timer. For installation, all switches were mounted on a piece of plywood drilled exactly as was the panel board. Prewiring the switches on this board simplified the actual installation.

The timer used to control the automatic shut-off was equipped with three separate circuits (Hagen, Model 73, Reset Timer, with three 15-amp. microswitches, with split cam adjustment, timing period easily adjustable from 0 to 30 hours). One of the switches is set to open about three-quarters of an hour before the other two. This switch was connected to the power supply terminals of the program timer, the running timer meter, and the ninhydrin pump. The ninhydrin pump must be shut down early so that the buffer pump can sweep the lines through the reaction coil free of ninhydrin reagent, otherwise the latter

may deposit solid material and plug the lines. The program control timer was wired to shut off early in order to sweep the lines to the long column free of the second buffer and be ready for connection to a new column.

One of the other two control switches on the shut-off timer was connected to the recorder and the two buffer pumps. This permits the recorder trace to indicate whether the lines have been adequately cleared of ninhydrin reagent. The third shut-off timer switch was connected to the power supply for the constant temperature baths which are on a separate circuit to minimize disturbances in the recorder circuit when the bath heaters switch on and off. The shut-off switch motor was also connected to the last switch to open for its power supply. The "Hold" position of this timer was not employed.

This automatic control system has worked very satisfactorily. Any component may be switched from manual to automatic or vice versa at any time, thus allowing complete use of the versatility of the original analyzer. The photometer lamps are not connected to the automatic shut-off device, since operation is more satisfactory if they are not turned off. Under ordinary conditions the reaction bath (100° C.) is also left on.

The Hagen switch can be obtained with varying numbers of switches and cams and can, therefore, be employed in many applications requiring opening or closing of circuits at predetermined times.

This report is based on work done at the

EASTERN UTILIZATION RESEARCH AND DEVELOPMENT DIVISION

Philadelphia 18, Pa.